

XV. *Notes on the Ephemeridæ, by Dr. H. A. HAGEN; compiled (with remarks) by the Rev. A. E. EATON, M.A.*

[Read 5th May, 1873.]

[TOWARDS the middle of June, 1871, I received from Dr. Hagen, of Cambridge, Massachusetts, a series of letters relating to the *Ephemeridæ*. They contained much interesting matter, not only in the form of original observations, but also in the shape of criticisms and corrections of my *Monograph on the Ephemeridæ, Part I.*, which had been published at the end of the preceding March. They conveyed information also respecting works which I had not been able to collate.

The letters from which the notes subjoined are compiled are four or five in number. They consist, in a large measure, of transcripts from Dr. Hagen's note-book, and the writing of each of them was a day's work. From this some idea may be formed of their extent. They are of a strictly private character. Written off-hand, in haste, without revision by the author, and with no intention that they should be published, they were susceptible of some little condensation, but not of much. The conjecture of one day was sometimes verified in a subsequent letter, so that remarks bearing on the same insect are to be found in more than one place. These scattered remarks it was advisable to bring together, so as to place the writer's views before the reader in the most convenient form. In order further to facilitate the application to my *Monograph* of the criticisms in the letters, I have reduced their materials into an order corresponding in arrangement with my work, and have indicated the pages of the *Monograph*, in which will be found the passages touched upon in the Notes.

My own remarks are enclosed in vincula []. Amongst them I have introduced corrections of errors of printing in the *Monograph*, which were not discovered in time to be inserted with the other corrigenda in the *Transactions* for 1871.—A. E. EATON.]

Page 2. [Dr. Hagen states that Say's collection is destroyed.] Harris's collection [in the Museum at Cambridge, Massachusetts] is in very bad condition. It contains some *Ephemeridæ* named by Say himself, but none of those described by him [see Note to p. 8]. Walsh's collection is now in the Chicago Museum. I do not know whether anyone takes care of it. [Has it survived the fire?] I possess types of his species [see Note to pp. 13, 14.] Besides the Walsh types, my collection contains, with few exceptions, the types of only my Ceylon and American Synopsis, and these are in good condition [see Note to pp. 13, 14.] From Zetterstedt I possess only two types [see Notes to pp. 10 and 88] ; from Burmeister one [see Notes to pp. 10 and 96.]

Page 3. 1552.—In Wotton, *De differentiis animalium*, &c., p. 193, is something about the occurrence of *Ephemera* on the river Hipparis. [Fiume di Camarana, Sicily. This work is not cited by Pictet.]

Page 3. 1680.—Blegny will be found in Banks' Library in *Bonnet's Zoodiucus medico Gallicus*.

Page 3. 1708.—[Ray in his *Methodus Insectorum* (1708) and *Historia Insectorum* (1710) described classes from the metamorphoses, and constructed orders from the number of the feet of insects. His Class II. Metamorphota, Order i., Larvis et pupis agilibus, would comprise the *Ephemeridæ*.]

Page 3. 1718 and 1723.—Baier and Kulmus are not important so far as I remember.

Pages 4 and 17. Linné in *Elenchus anim. per Suecica observata*, p. 78, gives three species of *Ephemera*. "1. Eph. alis maculatis, Swam. Tract. de Ephemera. 2. Eph. alis incrassato albis (bioculata). 3. Eph. alis albis minima (horaria)." Not a word more.

In *Miracula Insectorum* (Amœnit. iii.) he says, "*Ephemera* Fn. Suec. 754 (*E. horaria*) miraculosa videtur, quod tunica pupulæ deposita, perfecta per integrum diem vix vivet, quo brevissimo tempore spatio aere delectatur, nuptias celebrat, parturit, moriturque." So far as I know, nothing more is given by Linné.

Page 5. 1767.—In Pallas's own copy of Lin. S. N. xii. are the following notes in his handwriting. To *Eph. striata* is appended "*Eph. Sibirica* diptera triseta, setis villosis insecta minima a Laxmannio notavi. Dantur dipteræ plures species, *Pallas* Ephemera biseta corpore testaceo, thoracis dorsi pedibusque anticis nigris, quatuor reliquis setisque albidis, alis quatuor hyalinis, collum subdistinctum, caput depressum, oculis lateralibus prominentibus. Ad Ubam Junio 1777 magnitudine media. Videtur esse *Eph. culiciformis*," with the citation of Geoffroy. To *E. lutea* with (?) he adds "lineolis longitudinalibus nigris. In Uralensis montibus aquis Junio copiose."

[Of these *E. Sibirica* is doubtless a *Cænis*; the species referred to *E. culiciformis* is probably an *Heptagenia*; and to this last genus most likely belongs the subject of the appendix to *E. lutea*.]

Page 5. 1767.—O. F. Müller, in *Flora Friedrichsdalina*, p. 235, gives, as additions to his *Fauna Friedl.*, the names only of *E. culiciformis*, *horaria* and *diptera*.

Page 5. [1771.—The fig. 13 may prove to be the gill of *L. marginata*.]

Page 6. [1776.—Mül. For *russula* read *rufula*.]

Page 7. 1794.—Seetzen gives some very interesting observations on the habits and life-history, from oviposition and egg upwards, of his *E. lutea*, which I believe is *P. virgo*. He is one of the real observers. I believe you will find Meyer's Mag. f. d. Thiergesch. in the British Museum.

Page 7. [1805.—*E. Swammerdiana* in the note should be printed in ordinary type.]

Page 7. [1814.—T. Gray. The Works of Thomas Gray, edited by T. J. Mathias, 4to. London, vol. ii., p. 572. The late J. C. Dale, Esq., drew my attention, in 1868 or 1869, to a version of the Linnæan diagnosis of the orders and genera of insects done into hexameter verse by the poet. It is only a fragment. *Ephemera* is disposed of thus:—

Caudâ setigerâ, erectis stat *Ephemera* pennis.]

Page 8. 1823-4.—Say. Harris's Collection contains specimens named in MS. by Say and himself. Eph. (*Baetis*) *eurinus*, Say, MS., Massachusetts, is *Hexagenia limbata* ♀; but the wing is yellow throughout, and the anterior femur yellow with only a little black spot outside at the tip. I received from Texas ♂ ♀ of a very similar, perhaps new, species; but I do not now find sure specific characters.

Baetis amoenicauda, Say, MS., Massachusetts, is *B. femorata*, Walsh ♀ im. Perhaps my old opinion that Walsh's species are not those of Say is right.

Baetis costalis, Har., MS., Maine, is *Hex. limbata* ♂.

Baetis maculipennis and *maculata*, Har., MS., Maine, are *E. decora*, Hag. ♂ ♀ subim. I am not quite sure about their identity with my *E. natata* or Walsh's *decora*.

Baetis reticulata, Har., MS., Massach. and Alabama, is ♀ subim., new to me.

Baetis terminalis, Har., MS., Maine, is *Leptophl. nebulosa* ♂.

Baetis bispinosa, Say, MS., Massachus., is *Leptophl. cupida*, subim.

Baetis descripticostata, Say, MS., Dublin, New Hampshire, is *B. undata* ♀.

Baetis tenella, Har., MS., Maine, is *Heptag. maculipennis*.

B. fuscicostata, *confusa*, *irregularis*, *luteipennis* and *leuconeura*, Say, MS., of his catalogues, are destroyed.

Page 8. 1825.—Hummel. Essais Entom. No. iv. p. 71, n. 12, *E. citrina*.

Page 10. 1839.—Burm. I possess *C. discolor* [type] in my collection.

Page 10. 1840.—Zet. I possess two types, *vespertina* and *bioculata*, from Zetterstedt.

Page 12. 1850.—In Verh. zool.-bot. Gesells. Wien, i. 106, *Baetis binoculatus* is quoted as living in the Adelsberg Cave.

Page 13. 1855.—Fuss, Bericht ueber Neuropt. Siebenbürgen. A list; probably names only.

Page 13. 1855.—Goodias in Zeits. f. wissensch. Zool. T. vii. Heft 1, p. 2, figures larva of *Ephemera*.

Pages 13, 14. 1858-9, 1861, 1863.—H. A. Hagen. My collection is only worked out in *Ephemera*, *Palingenia*, *Oligoneuria* and *Cænis*. The rest are scarcely at all studied. It is rather rich in European and North American species; but in those from other countries it is almost tabula rasa, containing only some isolated examples. Most of the specimens are old; some of them, fifty years or more of age, are not preserved so well as I should like; but you know that it is impossible to set old ones, they would not bear to be relaxed. . . . I find that I have separated in my collection 160 species. There are besides a lot not classified from Central Russia, Siberia, Caucasus, &c., making in all more than 2,000 specimens. But some are very bad, and if re-arranged the number of specimens and perhaps of species would be smaller. . . . A List of the Ephemeræ of Hungary sent to me by Frivaldszky gives only the following names: *Cænis lactea*, *Paling. longicauda*, *Oligoneuria pallida*, *Potam. gibbus*(?), *P. æneus*(?), *Cloëon dipterum* and another allied species, a species allied to *C. melanonyx*(?), *Baetis sulphurea*(?), *cerea*, and *fluminum*(?). The specimens are still in my collection. A List of the Ephemeræ of Bavaria still in my collection sent by Dr. Kriechbaumer gives *E. vulgata*, Tegernsee, common, June. *E. Danica*, very common, Munich, June. *E. lutea*, Burm. (*lineata*(?)), Tegernsee, June; Munich, July. *Potam. Geerii*, Tegernsee, Munich, July. *Cl. pumila*, Munich, June. *Baet. venosa*, Tegernsee, May—July. *B. lateralis*, Tegernsee, Munich, April to July. *B. fluminum*, Munich, June, July. [M. de Selys-Longchamp's specimen of *E. Hecuba* is not Dr. Hagen's type as I supposed.] I possess types of Walsh's species: *Baetis femoralis* ♂ ♀, sub. ♂ ♀; *B. alternata* ♂ ♀, sub. ♂ ♀; *arida* ♂; *sicca* ♂ ♀, sub. ♂ ♀; *debilis* ♂ ♀. *Pot. cupidus* sub. ♂ ♀; *odonatus* ♂ ♀ im. *Pal. vittigera* ♂, sub. ♀; *limbata* ♂; *bilineata* ♂ ♀, sub. ♂; *flavescens* ♂ ♀, sub. ♂ ♀; *interpunctata* ♂ ♀; *pulchella* ♂ ♀, sub. ♂ ♀; *terminata* ♂ ♀, sub. ♂ ♀. *E. decora* ♂; *flaveola* ♂ ♀, sub. ♂; *myops* ♂. *Ephemerella excrucians* ♂ ♀, sub. ♂. *Bætisca obesa* ♂ ♀, sub. ♂ ♀, pupa. *Cloë ferruginea* ♂; *fluctuans* ♀; *vicina* ♂ ♀, sub. ♂; *debilis* ♂ ♀, sub. ♂; *mendax* ♂ ♀; *unicolor* ♀. Only two are wanting,—*P. 4-punctata* and *Cænis amicus*. [*Ephemerella consimilis* and *Cloë dubia* are not given in the list.] Besides Walsh's types my collection contains, with few exceptions, only the types of my Ceylon and American

species. In the Museum here are very few *Ephemeridæ* besides mine and some good things from Hudson's Bay and New England. [His collection contains also types of the Corsican and Sicilian species (Hag. 1860, 1864) and a few others from Burmeister (1839) and Zetterstedt (1840). These last two sets have been noticed above in the notes referring to p. 10 of the Monograph; the other two sets will be treated of below in the notes referring to the descriptive portion of the Monograph, where also series of specimens from Cornelius, Imhoff and others contained in his collection will be particularized.]

Page 13. 1857.—Brauer. In continuation add; & 74 bis. *Pot. mesoleucus*.

Page 14. 1864.—Cornelius in Correspondenzbl. d. Vereins f. preuss. Rheinlands, T. xxi. pp. 69—71, gives an interesting account of the apparition of *Pal. longicauda*.

Page 15. 1864.—Your reduction of the Corsican species described by me is apparently erroneous. [See below, note on p. 155 of the Monograph.]

Page 15. 1865.—Etn. [I have succeeded in verifying my conjecture that the female of *Baetis* enters the water sometimes for the purpose of oviposition. See below, note on pp. 118, 119 of the Monograph.]

Have you read the story of *Ephemera* by an old man, told by Ben. Franklin? A figure of an *Ephemera* in an old Chinese book is mentioned in *Naturforscher*, Stück vii. p. 30. Goetze, *Beytrage*, p. 204, confirms the observations of Schaeffer, and says that the same species lives in France (Seine, Marne), Germany (Donau, Main). He gives an interesting observation on the rearing of the insect. Hadrian Junius, in his *Nomenclator*, p. 84, gives only four words.

Page 17, line 13. [After ♀ add = *Polymitarcys*.]

Page 18, line 26. [Dele *zebrata*.]

„ line 32. [Dele ? ; and before ♂ im. insert = *undatus*.]

Page 18, line 39, end. [Add = *undatus* ♀ im.]

„ line 44. [Dele *zebrata*.]

Page 19. [Between *iridana* and *lateralis* insert *Krueperi*, Stein ; in *Potamanthus*, Stein ; (?) *Leptophlebia*, Etn.]

Page 19, line 12 from bottom. [For *insignis* read *longicauda*.]

Page 20, line 4. [For nov. sp. read = *undatus*.]

„ line 10 from bottom. [Dele “either a *Heptagenia*, or.”]

Page 21, line 7 from bottom. [Omit all the citations after Burm., and instead of them read = *dimidiata*.]

[Then between *lactea*, Burm., and *luctuosa*, Burm., insert † *lactea* ! Pict. . . . &c. = *chironomiformis* ?]

Page 22, line 17. [Before ♀ im. insert = *Polymitarcys*.]

Page 23, line 13. [Dele ?; before im. insert *undatus* ♂.]

„ line 15. [Before ♀ insert *undatus*.]

Page 24, line 3. [Omit all after 206, and read = *Leptophlebia*.]

Page 24, line 10. [Omit all after 476, and read = *Lep-
tophlebia*.]

Page 24, line 11. [For *Cloëon* ? ♂ read *Baetis* ♀.]

Page 26. [Between *cincta*, Retz., and *cognata*, Ste., insert *citrina*, Hummel, Ess. Ent. iv. 21 = *Heptagenia elegans*, subim. ?]

Page 27, last line. [Dele *longicauda*.]

Page 29, line 9. [Dele Seetzen (1794).]

„ line 12. [Before Pz. insert Seetzen (1794).]

Page 30, line 8. [For (sp. ?) read *dimidiata*, subim. ♀.]

Page 32, line 3. [For *Baetis* ? read *Polymitarcys albus*.]

„ [Between *elegans*, Curt., and *flaveola*, Pict., insert *fallax*, Hag. ; in *Baetis*, Hag.]

Page 33, line 6. [After Pict. add Typ. *H. limbata*.]

„ line 18. [After Walk. add Typ. *L. marginata*.]

„ line 35. [Add = *Baetis*.]

Page 33, line 43. [Between *scita*, Walk., and *strigata*, nov. sp., insert *signata*, Hag.; in *Cloë*, Hag.]

Page 34. [Between *Taprobanes*, Walk., and *vespertina*, Lin., insert *tristis*, Hag.; in *Clöe*, Hag.]

Page 34, line 20. [For *chironomiformis* read *dimidiata*.]

„ line 24. [For *Baetis* read *Polymitarcys*.]

„ line 3 from bottom. [After described, insert = *Hexagenia albivitta*.]

Page 35, line 3. [Dele = *longicauda*.]

„ line 14 from bottom. [For *Campsurus* read *Polymitarcys albus*; dele?]

Page 35, line 8 from bottom. [After described, insert = *Campsurus lutipennis*?]

Page 36, line 8. [Before *indicus*, insert as first in the series, *albus*, Say; in *Baetis*, Say; *Palingenia*, Hag.]

„ line 3 from bottom. [Before = insert Brau. N. Aust. 74, bis.]

Page 37, line 11. [For *Leptophlebia* read *Baëtis*.]

„ [Between line 17 and line 18, insert *mesoleucus*! Brau. N. Aust. 74, bis = *Leptophlebia*.]

Page 38, line 6. No described *Ephemera* is contained in Stettin amber. Amber is either not found at all at Stettin or only rarely. All the amber insects are from Eastern Prussia, from between Danzig and Königsberg to Memel. I believe that when I described the amber species my knowledge of the living forms was rather limited; perhaps other conclusions respecting them would be arrived at now.

Page 38. 1856.—Goldenburg. I also believe that *Dictyonera* does not belong to the *Ephemeridæ*.

Page 38. 1861.—H. A. Hagen. My Solenhofen *species* are perhaps untenable. Of *Ephemera cellulosa* I have now beautiful specimens, and even of *mortua* some better ones.

Page 38. 1865.—Leonhard and Geinitz, Jahrb. f.

Mineral. &c., p. 385. *Ephemerites rupestris* is not a name given by me, [as I supposed it to have been; see Monograph, p. 40.] Prof. Geinitz sent a photograph to me, and I wrote my opinion about the species. I do not know whether the figure is exact.

Page 38. 1864 and 1866.—Scudder. [Mr. S. H. Scudder's papers are published in the American Journal of Science, xl. 269—271; and in the Proc. Boston Soc. Nat. Hist. (December); separate p. 20, pls. 4.]

Page 39. I am of your opinion concerning the species described by Scudder. But I would observe, that, up to the present time, I have been unable to obtain access to any of the types. . . . The three species described by Mr. Scudder as *Gerephemera simplex*, *Ephemerites gigas* and *affinis*, do not belong to insects at all. If you will compare the figures and descriptions of fossil plants from the same localities given by Lesquereux in the 4th volume of the Geological Survey of Illinois, you will see at once that the *Ephemerites* are only parts of leaves of *Hymenophyllites* or of *Neuropteris*. I believe that some other of the species are similar.

Page 41. An observation that in copula the male of *Ephemera* is beneath the female, is to be found in Latr. Hist. Nat. ii. 238.

[In the notes below will be found detailed accounts of the entrance into water for oviposition of the female of *Baetis* (Note for p. 119, *B. pumilus*), and of the casting of the subimaginal pellicle of *Cænis* (Note for p. 95, *C. dimidiata*).]

Page 45. [Transfer “[puella] New Orleans” from Campsurus to Polymitarcys.]

Page 46. [Transfer from p. 48, Gen. xxii., and insert after *Leptophlebia femoralis*, “tristis . . Rainbodde, Ceylon,” and “signata . . Rainbodde.”]

Page 46. [Transfer “Krueperi . . Greece” from *Leptophlebia* to p. 47, and insert it after *Baetis binoculatus*.]

[Give Sydney as the locality of “*Leptophlebia* [costalis].”]

[Insert *mesoleuca* . . Austria, between *Lept. modesta* and *fusca*.]

Page 47, line 2. [For russulum read rufulum.]

Page 47. [Merge with *Baetis undatus*, *B. fluctuans*, *pictus* and *ferrugineus*.]

Page 47. [*Baetis*? [*albus*] and ? [*Ephoron leukon*] are probably *Polymitaecys puella*.]

Page 48. ["*Heptagenia*? [*tessellata*, *Hag.*] Puget Sound; Washington," is almost certain to be *Leptophlebia colombiæ*, p. 46.]

Page 54. *Lachlania*.—I examined 19 ♀. They are not in very good condition; the eggs in most are either deposited or just coming out. The ventral segment with the eggs coming out seems open at the sides. This I have designated (perhaps improperly) the egg-valve. The specimens are not in sufficiently good condition to enable one to be entirely sure about this formation.

[I have examined a ♀ *Lachlania* in Mr. M'Lachlan's collection, and find no trace of an extension of membrane in the form of an egg-valve, such as may be found in *Heptagenia*. The oviducts are unprotected as in *Ephemera*.]

Pages 55, 56. I have compared the figures of *Olig. pallida* with my type, and believe them to be correct for the forceps. The forceps is 3-jointed, one long basal and two short apical joints. The membrane below is rounded before, and the penis is nearly covered by it. *O. Rhenana* has the forceps three-jointed, the penis bifid and considerably longer than the quadrangular membrane below. In both species the forceps is more membranous than corneous. I remark purposely that of both species I have only one male imago before me, and only one female imago of *O. pallida*. In Imhoff's collection in the Museum, I found seven ♂ and more ♀ subimagines of *O. Rhenana*, all alike as to the penis and the membrane below it, excepting one, which is more similar to *O. pallida*. I am not sure that these males are not imagines, the imago described from Von Heyden's collection being not at hand now. Two female imagines from Elberfeld are very similar to the female *O. pallida*. Of course new observations are necessary.

[In August, 1871, I again took *Oligoneuria Rhenana* ♂ imago on board a steamer at Cologne. The structure

of its genitalia quite corresponds with the figure in my Monograph. It is preserved in fluid. I suspect that my caution respecting dried specimens (Mon. p. 56) was therefore not altogether misplaced. When I was writing that caution, I had in my mind the results of some early investigations of dried specimens, in the course of which I managed to fabricate two if not three species out of British and foreign examples of *Cenis macrura*, and I do not know how many out of *Heptagenia elegans*, all authenticated by camera lucida drawings of structures! Is it not natural to be sceptical of drawings made from dried specimens after that?]

Page 57. *C. latipennis*.—*Palingenia umbrata*, Hag. Syn., is a *Campsurus* in very bad condition: perhaps *C. latipennis*. The specimen is a little smaller than your dimensions.

Page 58.—Pictet's *Pal. puella* is, after the figures, surely a *Polymitaercys* and not *Campsurus*. I believe it will go with *B. alba*. *B. alba*, Say, is a *Polymitaercys*. I caught it at Niagara Falls at the end of August, swarming just like *P. virgo*, to which species it is closely related, though distinct. It is undoubtedly *Ephoron leukon*, Williamson, from New Jersey. I have a male from N. York, taken not so very far from Belleville, N. Jersey. The colour of the abdomen alone would not agree. The type from Red River is a female, and smaller than some males. The description of Say has apparently nothing in common with *B. ferrugineus*. Of course this is a matter of opinion. The reference to snow flakes makes me believe it to be a *Polymitaercys*.

[I had not seen a *Polymitaercys* from America, and was inclined to suspect that the third seta in Pictet's figure was merely an artistic embellishment. With this bias, I was led to refer *P. puella* to *Campsurus*, that it might be near *P. albicans*. I was induced to attach some weight to Mr. Walsh's opinion about the relations of *B. alba* to *B. ferrugineus*, from the supposition that he would not have differed from Dr. Hagen without some good reason. I entirely concur with Dr. Hagen now.]

Page 59. *P. dorsalis*, Burm. One of my (3 ♀) specimens is nearly as small as Pictet's type, the others larger. Burm. gives the length 10 lin.

Page 60. *Polymitaercys virgo*. Pallas, Iter, i. p. 15, found near Choroshown, a village near Moscow and the river Moskwa, the larva of *E. horaria* [= *P. virgo*] very common, boring parallel tubes in the clay, which are also to be found in the more hardened earth. (Extract from Pallas's MS. notes in Linné, Syst. Nat. ed. xii.)

The manuscript descriptions of Pallas's Insecta Russiæ contain, inter alia, *Ephemer lactea* [of which Dr. Hagen transcribes the description, and states that it is apparently *P. virgo*]. In Tauricæ campestribus sub finem Julii ad rivulos passim frequens vespertino tempore: ad lucem advolat, et ovorum femina subito ejicit flava, modo integra, modo per proportiones, remanenti pellucida albida.

Page 61. [Between *P. indicus* and *P. macrops*, insert the foot note on p. 124, and the description, &c. of *C. puella*, pp. 58-9.]

Page 62. *P. longicauda* and *fuliginosa*. I believe *E. fuliginosa* is a different species from *longicauda*, and if you saw it you would have no doubt as to its being so. The parts which in *P. longicauda* are light yellow-gray, even in Hungarian specimens, are in *P. fuliginosa* dark coffee-brown, even in specimens nearly seventy years old. I have had hundreds of *P. longicauda* in my hands, and even now in my collection are twenty-seven from Cornelius . . . and a type of *E. flos-aquæ*, Hoffmansegg, from Hungary. [The omission relates to several German localities which need not be specified.] *P. longicauda* was sent by Frivaldszky to me from Hungary, and is in my collection.

Page 64. *H. albivitta*.—*P. dorsigera*, Hag. MS., Synop. 304 from Buenos Ayres (not as is erroneously stated from Monte-Video), is *H. albivitta*.

Page 67. I have two *Hexageniæ* from Mexico, one with dark coffee-brown wings, which I do not find in your Monograph.

Euthyplocia Hecuba. You speak of a male from Selys determined by me. So far as I remember I have either only glanced at it, or there is some mistake.

[On referring to my notes of the collection alluded to, I find "Hagen's type, Mexico," set down against the name of the present species.]

Page 69. *Ephemeræ vulgata* and *Danica*. A list of the *Ephemeræ* of Bavaria, sent by Dr. Kriechbaumer, contains both species [see Note, pp. 13—14, above]. So does a set of *Ephemeræ* sent by Schmidt from the neighbourhood in which Scopoli collected. I do not know whether the copious and exceedingly abundant species, used as manure in Laz (according to Scopoli), is *E. Danica* or not.

Ephemeræ guttulata. [See Note to p. 8, above; *B. maculipennis*.] The type of *decora*, Walsh [♂], hardly agrees with my like-named species, but is perhaps not distinct. My *natata* from Saskat[chavan] is larger, and (so far as I can see in ♂ ♀ im. and subim.) different in colour; but the appendices seem similar in form, though I have not quite completed my examination.

Page 71. *E. myops*. The female from New York, quoted by you as perhaps referable to *E. myops*, is a new and entirely different species, analogous in colour to *E. Danica*, but much brighter.

E. lineata. I believe that my *lutea*, Burm., is your *lineata*; and this species differs from that represented by the four ♂ ♀ subim. from England, described as *glaucops*, which agree with Pictet's characteristics of this last-named species very well.

[In a more recent letter to Mr. Walker, I have suggested that the four specimens alluded to are not genuine British insects, but Swiss or Italian examples of *E. glaucops*, which were accidentally arranged in some series of English *Ephemeridæ* by somebody or other. I do not know who gave them to Dr. Hagen. Mr. Walker in reply says of *E. glaucops*, "I think with you that it has been called British by error." My guess in my Monograph was based upon the assumption that there was no doubt as to the specimens being British. As the matter stands now, I think that this assumption had better not be made.]

Page 74. *E. fasciata*. [My figures of details agree with the structure of Dr. Hagen's type.]

Page 81. *Leptophlebia costalis*. [Habitat Sydney (Brauer).]

Page 82. *L. Taprobanes*. After the forceps in your work, I have no doubt that *Pot. annulatus*, Hag., is *B.*

Taprobanes, Walk. Only the genus *Baëtis* led to my error.

[What then becomes of my *L. annulata*, of which I accepted as types a ♂ im. in the British Museum, and another ♂ im. in M. de Selys-Longchamps's collection, both of them said to have been authenticated by Dr. Hagen? I suspect my fig. 23 (immediately below 23 a, b, and accidentally unnumbered), in which the terminal joint of the forceps is not represented, having been concealed by the penultimate joint from the point of view from which the drawing was made, is the cause of misapprehension. The proportions of the last two joints are given in 23 a. The forceps in both *L. Taprobanes* and *L. annulata* are very much alike; it is the penis which should be taken as the principal criterion of identity in examining specimens of *Leptophlebia*, and of this structure Dr. Hagen makes no mention. It therefore remains to be seen whether *annulata* should be reduced to a synonym or not. I still suspect that the species described by Dr. Hagen in 1858 is distinct from Mr. Walker's *Taprobanes*.]

Page 83. *Lept. femoralis*. I possess ♂ ♀ imago and subimago. The tarsi of the hind legs are four-jointed; claws alike very small. The forceps, penis and hind wings are greatly damaged; but with care everything can be made out. The middle seta is wanting (broken?) in all; but I believe the species belongs to this genus.

[The absence of the middle seta in the Ceylon species seems to have caused Dr. Hagen a little trouble and hesitation. In my characters of this series of the genus I have stated that these species usually cast off the intermediate seta. Now and then individual specimens retain it, but they are scarce.]

[After *L. femoralis* some of the "Species generis incerti," described in the foot-note of pp. 131-2 of the Monograph, should be inserted; my conjecture as to their belonging to *Leptophlebia* having been verified by Dr. Hagen.]

Page 83. *Lept. tristis* [Monogr., p. 131, foot-note, No. 1.] I have never stated that the male of this species has three setæ (as you say at p. 131); only of *C. ? signata* did I mention this. In fact I had seen of *L. tristis* only the female subimago; which, when alive, is stated to be "oculis parvis nigris." One of my types is in good con-

dition, with tarsus of the hind legs (I believe) four-jointed, the wings as in *Leptophlebia*, and the hind wings as in your fig. 24.

Lept. signata [Monogr., p. 132, foot-note, No. 4] is perhaps *Leptophlebia*; and, so far as I can see, the only Ceylon species with three setæ, as I stated before.

Page 84. *Leptophlebia colombiæ*. *Baetis tessellata*, Hagen. You say the type is in the Berlin Museum; but I say (p. 51), at the end of *Baetis*, "I saw a species of *Baetis*, from Mexico, in the Berlin Museum." *B. tessellata* is still in my collection; a female subimago, with posterior tarsi four-articulate.

[Insert here the foot-note to p. 150 in the Monograph. The possession of four-jointed hind tarsi quite falls in with my conjecture.]

Page 85. *Leptophlebia marginata*. In May, 1853, I caught, in a small river near Königsberg, a very common nymph, which I think may be referred with certainty to this species. The living nymphs are dark brown and polished: in alcohol they easily lose the gills. Roesel, II., xii., 1, 2, seems to figure my larva and subimago. His observation of the copulation of the subimago seems to be an error. I still possess the nymph.

Page 86. [Line nine from bottom; for "maroon-brown" read "castaneous."]

L. ? Krueperi. [Herr Stein, in May, 1871, wrote to Mr. McLachlan asking him to tell me that this species, according to his later observations, "does not belong to *Leptophlebia*, but to *Baëtis*, Leach. The mutilated individuals possess the remains of only two tails, instead of three." It was the colour of the insect which had most to do with my questioning the reference of this species to *Potamanthus*, Pict.]

Page 87. *Leptophlebia Picteti*.

[Imago ♂ v. s. s. Venæ in areæ marginalis apice simplices rectæ. Crura posteriora albida. Setæ fusco-piceæ, juncturis piceis.

Habitat.—Pallanta, Italy. August.

The lobes of the penis are narrow, and towards the

apex are suddenly contracted to a slender point. The appendages beneath it are linear, and are about half as long as the lobe. (From a specimen in Mr. Albarda's collection).]

Page 87. *Leptophlebia cincta*. I believe *E. halterata*, Fab., to be a *Cænis*; and if the descriptions in the different works of Fabricius be carefully compared with one another, I think my opinion will be established. In the diagnosis in Sp. Ins., Mant. Ins. and Ent. Syst., it is expressly stated, that the species has only two wings, though in Gen. Ins. this was only given in the description. Fabricius of course considered this to be an important character. The words "*alæ magnæ*" in Gen. Ins. are not afterwards repeated in Ent. Syst.; and the words "*marginè crassiori nigricanti*," together with the arrangement of *halterata* before *E. brevicauda*, seem to be very agreeable with the supposition of its being a *Cænis*. "*Abdomine fusco*," given in Gen. Ins., is a character presented by dead males only, and is afterwards rightly omitted. The "*setæ triplo*" (Gen. Ins.), or "*quadruplo longiores*" (Ent. Syst.), is applicable only to the male. The citation from De Geer is apparently erroneous.

[What led me to refer *E. halterata* with a query to *Leptophlebia cincta* was my giving some importance to this citation of De Geer. Having accepted this reference, I felt bound to reconcile the diagnosis of Fabricius with the species of De Geer. Accordingly I supposed that either "*alæ magnæ*" was equivalent to "*large wings*" (an expression implying the presence of a smaller pair), or I supposed that Fabricius' type had lost the posterior pair (a thing that has often occurred in my own collection, where *Psocidæ* used to provide me with dipterous examples of *L. cincta*, and of various sorts of *Baëtis*, ad libitum); and I further assumed, that Fabricius must have counted the abdominal segments in this instance from tail to head. If Fabricius' reference to De Geer is worth nothing, these suppositions of mine are also of no value, and Dr. Hagen's relegation of *E. halterata* to *Cænis* is completely substantiated.]

Page 88. *Leptophlebia vespertina*. I have types of Zetterstedt's species. I used to think them to be identical with *Pot. brunneus*, Pict., but this must be verified.

Page 90. At bottom insert—

[*Leptophlebia mesoleuca*.

Potamanthus mesoleucus, Brau. 1857.

Imago, v. s. s. Tergum thoracis aterrimum politum. Alæ vitrinæ, venis fuscis; anticis, nervis in area costalis apice curvatis plerumque simplicibus. Pedes albi femoribus fusciscentibus; antici saturatiori. Abdomen decoloratum, setis albis juncturis obscuratioribus. Forceps albus. Penis appendiculatus, segmentis ejus appendiculis parum brevioribus; his paulo eis *L. modestæ* latioribus.

Long. corp. 6—7 mm.; set. circa 8 mm.

Hab.—“Im Prater an Sümpfen. Juni.” (Brau.)

Mr. Albarda drew my attention to my having overlooked Brauer's Supplement, at p. 74 bis of his Neuroptera Austriaca, and sent me types from Brauer of the *Baetis sulphurea* and *Pot. mesoleucus* there described. The former is not Pictet's species (which is *Heptagenia elegans*, Curt.) but another, which is allied to *Heptagenia flavipennis*, wanting the bands on the femora. It will have to be renamed. From the type (♂ im.) of the second of Brauer's species, I was able to determine the relations of *L. mesoleuca*. It has the forceps and adjacent ventral plate very like those of *L. modesta*; but the apical joint is as long as the second, and each of them is as long as the first.]

Page 93. *Cænis macrura* (halterata, Fab., Hag.). I have before me a lot in a phial dry, perhaps more than a thousand. They are from Rismansfelds, a little bath-place near the Frisch Haff, where in the gardens the tables are covered with them in the morning, to the depth of some inches. Pictet, p. 42, relates nearly the same thing of his *C. lactea*. I have specimens from Eastern Prussia, (Königsberg.)

Page 94. *Cænis lactea*, Pict. (? *chironomiformis*, Curt.). I possess a lot sent by Bremi “17th June, 1854, very common on the lake at Zürich.” This is apparently Pictet's species, and I had it with me in London, but none of the specimens in Stephens' collection agreed with them. But this is not my *halterata*, nor the *lactea* of Burmeister. I believe that *C. chironomiformis*, Steph., was ♀ of my *halterata* [i. e. of *macrura*.]

Page 95. *Cænis dimidiata* (lactea, Burm., Hag.; *E.*

plumosa (♀ sub.), Mül., Hag.). On the 26th and 27th of June, 1869, between 6 and 7 P.M., at the border of a large pond (Obertisch) near Königsberg, this species was exceedingly abundant. After sunset it disappeared. In a short time I was covered with subimagines preparing for metamorphosis. Having sat still a few minutes with expanded wings the subimago exhibited a tremulous motion; the skin split along the whole length of the median dorsal suture of the thorax; the head appeared; the wings were going down in the manner of a roof near the abdomen, and by visible peristaltic motion the abdomen and the setæ were got loose, and by continued efforts and wriggling of the body from side to side the thorax and wings slowly (in one minute) came out. The legs until then are kept by the exuviae quite close to the body, nor can they be extended before the wings are entirely free and suddenly erected. As soon as this is effected, the legs take hold of something and finish the freeing of the abdomen and setæ by walking away from the skin. The insect then flies off from its seat. The empty skin of the subimago is very delicate in texture, snow white, and the thorax is gray with a grayish bundle of crumpled-up wings on each side. I was unable to find pupa or pupa-skin on the plants in the water or on the water. As the subimago was of course just risen, the insect probably undergoes the transformation from nymph to subimago in the water, like *Pal. longicauda*. I pinned several subimagines, and found that the thorax afterwards underwent the metamorphosis, and so the specimens are half imago half subimago. Perhaps this fact may explain some descriptions in the authors which are not applicable to known living species. All specimens in a collection with the wings bent down may be suspected of being in this transition state; but the imago sometimes assumes the same posture when pinned. Concerning the ocelli, Pictet has a very important error. The two lateral ocelli, shortly stalked, are very near the oculi (vide Burm.), just above the base of the antennæ, and not, as in Pict. Ephem. pl. xliii. 2, in the middle of the front. The anterior ocellus, situated below the margin, is nearly invisible from above. It is overlooked in every description that the middle seta is longer than the others, and that all three of them in subim. ♂ ♀ and imago ♀ very soon after the base are pilose and have a stronger pilosity at the tip. I have specimens from Hungary.

Two males caught after 10 P.M. in another locality are

paler (and so far as I can remember, all specimens caught late in the night are not so dark in colour), but the fore femora are darker.

Two males caught at Neuhausen, not far from Pillau, were sent to me by Prof. Zaddach as *luminous* insects. He had seen them in the night giving a small blue light.

[My own observations of the moulting of the subimago quite tally with Dr. Hagen's. I have likewise failed to find the pupa-skin on the water out of doors. But I found that the specimens which I reared in the house in flower-pot saucers, changed from nymph to subimago at the surface of the water, and left the empty pupa-skin afloat, just as *Bactis* or *Ephemera* does. I had intended to describe the visual organs in some future part of my work when treating of the comparative anatomy of the *Ephemeridæ*. Perhaps I may never have time to do this. In my descriptions I have indicated that the central seta is not invariably the longest.]

Page 96. *Cænis discolor*. My type was labelled "albida" in Winthem's collection; but it is closely conformable with Burmeister's description. It has unusually long wings, and perhaps represents a new genus. Habitat. Caffraria.

Page 97. *Cænis luctuosa*. My collection contains specimens from England, Germany and St. Petersburg.

I think *Cænis* to be more nearly related to the old *Palingenia*, *Oligoneuria*, &c., than to the genera with which you class it.

[I have stated some of my grounds for considering *Cænis* to be closely allied to *Leptophlebia* rather than to *Palingenia*. In my paper on the nymph of *Cænis* (Etn. 1868) I also stated my belief that *Oligoneuria* will be found to be very nearly related to *Cænis*; but without knowing the nymph I decided not to remove that genus from the neighbourhood of the old *Palingenia*.]

Page 102. *Cloëon dipterum*. Larva yellowish-brown, the head a little darker, eyes black; thorax with a dark spot on each side, legs pale; as far as the middle of the caudal setæ the joints have dark basal rings and are hairy. Length 7mm.

Nymph (winged) or pupa. The abdominal segments,

2—6 above, have on each side a pale spot behind a darker dot, and in the middle of their base a small yellow triangle. Up to the middle of the setæ their joints have dark rings at the base; then comes a long black space divided into three by fine pale rings; next come three joints entirely pale; the rest of the seta is dark. The setæ are plumose from the base as far as the terminal dark portion; their long hairs are white on the three pale joints, nearly black on the long black space, and dark between it and the base. Length of body 8mm., seta 6mm. [The setæ of *Siphur* are rather similar.]

Subimago. Eyes black, the turban orange, head and thorax dull brown, wings ashy-grey. Length of seta 8mm.

Page 105. *Cloëon rufulum* [misspelt *russulum*]. Now some words about your nomenclature. You write *E. russula*, Müller; but he wrote *rufula*.

[Familiarity with the fungi of the genus *Russula*, Fries, led me to write *s* for the old italic *f* and then to double it.]

Page 108. *Centroptilum luteolum*. I do not know why you have taken Müller's *E. luteola* for this species. I do not understand the word "lepidota" used by him; it is not old Latin; perhaps it means iridescent. Müller would not have forgotten to mention the brown tip of the abdomen; or he had seen the female only. Your determination is possible; but that is all that can be said about it.

[The diagnosis of Müller's species is "*E. luteola*, lepidota lutea cauda biseta, alis pedibus setisque albis." From its position in the book, one would be led to search for the insect referred to in Pictet's genus *Cloë*. Three species of *Cloë*, whose females are yellow, occur in Denmark, viz.:—*Cloëon rufulum*, *Centroptilum luteolum* (*translucidum*, Pict.) and *Baëtis binoculatus*. Of these the first is dipterous, the other two have rudimentary hind wings, those of the *Centroptilum* being the smaller. Müller describes the male of the *Cloëon* under the name of *E. rufula*, immediately after the diagnosis of *E. luteola*. He also describes the male of the *Baëtis* under the name *E. diaphana*, next but one before the diagnosis of *E. luteola*. He notes of *E. rufula*, "*Diaphanam refert, at alæ minores nullæ, nec squamulæ*," which implies that he knew that

diaphana has scale-like hind wings. The word "lepidota" (Greek for scaly) occupies in the other diagnoses the position which is held by "diptera" in the diagnosis of *E. rufula*, and therefore no doubt refers to the scale-like hind wings. *E. luteola* is therefore probably the female of the *Baetis* or of the *Centroptilum*. The words "pedibus setisque albis" are more generally applicable to the female *Centroptilum* than they are to the female *Baetis*.]

Page 110. Genus *Baetis*. Imago.—You have forgotten to state the number of joints in the posterior tarsi of *Baëtis*.

[They are four-jointed, and the proximal joint is longer than the second or third.]

Page 111. *Baetis binoculatus*. You write *binoculatus*, Linné; I would never correct Linné in this way; the name *bioculata* is adopted by all writers.

[Messrs. J. W. Dunning and G. R. Crotch, both persuaded me to make the correction. We talked over the matter before the Catalogue of British Neuroptera was published in 1870.]

Page 118. *Baetis pumilus*. [In June, 1871, near Ashbourne, in Derbyshire, whilst searching in a very small streamlet for nymphs of *Nemoura* (the *N. cinerea* of M'Lachlan's Catalogue) at noon, I found a female of *B. pumilus* beneath the water depositing her eggs upon the under surface of a stone, which I turned up. The eggs were arranged close together in a single layer in the form of a rounded patch. When she was removed from the water, her wings erected themselves. Shutting her up in a box for security I hastened home, and (in about a quarter of an hour after her first capture) placed the stone, with her upon it, in a glass jar partly filled with water, leaving her, without further interference, exposed to the air. She very soon crept down to the water, and after feeling it carefully with her anterior legs, walked into it. As she entered it, her wings once more collapsed, folding together neatly lengthwise, so as to form a narrow pointed sheath, which extended over the back of the abdomen as far as the base of the setæ. If I am not mistaken the setæ were placed together side by side. She remained submerged several hours, quite at her ease, and died in the following night without returning to the air,—living

in fact about as long as she could have been expected to live after oviposition if she had never entered the water.]

Page 120, note No. 2. [If after the word "longissimis" in the diagnosis *oculis* be supplied, *B. speciosus* might be referred to *Heptagenia fluminum* ♂ im. The length "3 lin." in German lines would be equivalent to half an inch English measure, or nearly 13mm., which is the size of *H. fluminum* ♂ according to Pictet.]

Page 123. *Baetis undatus* (*fluctuans* ♀, Walsh, p. 122; *pictus*, Etn. p. 122; *ferrugineus* ♂, Walsh, p. 124).—*B. pictus* agrees after the description and the neururation of the hind wing very well with the two types of my *Cl. undata* from New York and the Red River. It also agrees perfectly well with the male type of *Cl. ferrugineus*, Walsh, from Rock Island, Illinois. Two females in Harris' collection, marked down by Say in his own handwriting as *Baetis descripticostata* from Dublin, N. Hampshire, are the same species. I once compared two types of *C. fluctuans*, Walsh, and I am now of the opinion that they belong to the same species. I believe I can see in one of the hind-wings the short longitudinal nervure not seen by Walsh. The two females differ in so far as they have very many fewer cross-veinlets in the fore-wing, especially near the terminal border and tip. I cannot now find any other difference, as their general arrangement is the same (though it would seem to be different by my communication to Walsh, p. 178). The other females also differ in the number of the cross-veinlets, but not so much. One has the border much less coloured with brown. The peculiar dotting of the body, &c. seems to prove completely the identity of *C. ferrugineus* and *fluctuans* as male and female of *undatus*. I have not seen Pictet's species. The figure is a bad one, but the description makes me believe in its identity with my *undata*, especially as your specimens are from Texas. Of course it is possible that other similarly coloured species may exist, though none so peculiarly marked are known as yet.

[The omission of any mention of the dotted marking of the legs and abdomen in the descriptions previously published, led me to fancy that the Texan specimens represented a new species, for I have not met with any similar pattern of leg-colouring in any other of the Ephemeridæ; This bar to the union of the four supposed species being

removed, there can be no doubt of their identity with one another. There is a sexual difference in the neuration of the wings in *Cloëon dipterum*, somewhat similar to that which is presented by *Baëtis undatus*.]

Page 131, foot-note No. 2—*consueta*. This species seems to be dipterous, at least some of the specimens do. A female subimago, however, has hind-wings. I stated I was doubtful if all of them should be placed together.

Page 136. *Heptagenia semicolorata*. My *Baëtis semicolorata* is not at all your species, and the only one like it as to the forceps is your vi. 13 of *H. fusea*. I have before me several males and females from England. Judging from the egg-valve of the female (which I do not find in your work) it is scarcely a *Heptagenia* even. The figure vi. 9 is entirely different.

[With all deference to Dr. Hagen, I still consider my species and his to be identical. The differences between his specimens and my figures are due to his examples being dried specimens, and my drawings being made from specimens only just dead. Want of space compelled me to omit the figure of the last ventral plate but one ("egg-valve," Hag.) of the female, which is more deeply excised than is usual in *Heptagenia*. I cannot see much peculiarity in the nymph as compared with the nymph of *H. longicauda*, *venosa* or *lateralis*; but I do not possess the nymph of a yellow species such as *H. elegans*. Therefore at present I am disinclined to attach much weight to the peculiarity of the penultimate ventral plate. In dried males the lobes of the penis shrink a good deal, and their junction is concealed beneath by the penultimate ventral plate. This plate, too, is not then backed up by the fleshy cushion of integument which, in my figure taken from a recent example, is seen to intervene between it and the penis; and so the last visible ventral segment in a dried specimen exhibits only the two triangular lobes which are seen in my figure beyond the semicircular protuberance of the belly of the segment. To prevent any chance of a mistake, I may say distinctly that Stephens' species is identical with Curtis'; Dr. Hagen has seen Stephens' types, and his species is identical with Stephens'; and I also have compared my types with Stephens', and find them likewise identical.]

Page 143. *Heptagenia flavescens*. Your figure of the forceps is not very correct.

Page 145. *Heptagenia elegans*. [The following is probably the subimago.] *Ephemera citrina*, Hummel, 1825.

"*Ephemera citrina*, cauda biseta, flava, alis flavissimis posticis margine nigricante."

Descr.—"Statura et similitudine *Eph. bioculata* sed major, et alæ coloratæ. Caput flavum, oculis nigris tuberculis luteis. Thorax flavus, luteo-variegatus. Abdomen flavum, linea longitudinali et strigis transversis fuscis, segmentis duobus ultimis albidis. Setæ corpore duplo longiores, albidæ fusco-annulatæ. Alæ reticulatæ citrinæ parum hyalinæ, anteriores margine antico obscuriore; posteriores margine postico nigricante. Pedes flavæ longitudine æquales. Long. corp. setis exceptis 5 lin. Alæ anticæ 2 lin. Habit. Petropolis."

[In the foregoing description I may observe that *Eph. bioculata* probably stands for *bioculata*, Röm., i. e., *H. elegans*; "caput . . . tuberculis luteis" most likely refers to the rhomboidal spots near the eyes above; and the last two segments of the abdomen of *H. elegans* are often pale ochreous above.]

Page 146. *Heptagenia fluminum*. [To synonyms add (?) *E. speciosa*, Pod. 1761: and refer to Note to Mon. p. 120, No. 2.]

Page 151. *Heptagenia venosa*. According to your figure of the forceps and your description, my species is identical with yours. Fabricius has in all his four works the diagnosis of his species in precisely the same words. In Sp. Ins. he adds the citation from De Geer. The description of De Geer is long, and contains nothing to oppose the identification of his species with that of Fabricius, who gives Denmark as a locality. Müller makes no mention of the species, unless it be the altogether insufficiently described *E. gemmata*. Villers names the species *E. nervosa*, but does not state why he did this. Burmeister's short diagnosis corresponds, if the "subtus ochracea" is De Geer's "subtus grisea;" only the abdominal segments "basis ochraceis" are not mentioned by De Geer. The dimensions agree, and Curtis's *B. dispar*

is quoted. Pictet cites all the authors mentioned; but his citation of Burmeister is doubtful on account of his not having seen the types. But I believe Pictet's species to be different from that of Fabricius and De Geer. The eyes are in Pictet said to be brown; in De Geer sea-green. the abdomen in Pictet "fauve," marked with black; in De Geer very dark brown, nearly blackish: Pictet "Les ailes sont transparentes. . . . avec des nervures noires, . . . vers l'extrémité de la région costale. . . . une teinte brune;" De Geer hyaline without colour. Pictet does not mention the "abdomen subtus griseum." My type from Elberfeld is exactly like your *H. venosa*, though I believe the ventral lobe of the last segment in your figure to be not sufficiently rounded; I did not give the penis because it agrees with your vi. 24. The border of the ventral membrane is more rounded and has only a tubercle at the side; in my *H. venosa* from Corsica the border is less rounded and has a tooth at the side; in *H. gemmata* the border is nearly straight, and has a triangular lobe at the side. In the last two the two spines between the lobes of the penis are wanting; the form of the penis and the ensiform inferior processes are different. The ventral lobe of the same segment in the female is also different. I did not find these species in your Monograph. I believe that *E. maculata*, Poda, does not belong here.

[I hardly know whether to attach much importance to the preceding discrimina, because they are based upon comparisons of dried specimens; but I give them for what they may be worth. The figures of the ventral lobes of the females in particular appear to me to be taken from distorted examples. Still they might be found of some use in investigations of dried specimens. The only very positive and trustworthy distinction mentioned is the colour of the eyes,—brown in *H. venosa*, and sea-green in De Geer's species.]

Page 152. *H. longicauda*. [Add *Baetis montana*, Hag. 1863 (nec Pict.), to the synonymy of this species.]

Page 153. *Heptagenia insignis*. [Erase from the synonymy "*Baetis montana*, Hag. 1863; (nec Pict.)" Dr. Hagen encloses a figure of the forceps and penis of his species, and rightly observes that it is distinct from *H. insignis*. His drawing appears to be made after a dried specimen; and I take it to represent the genitalia of

a dried male of *H. longicauda*. Dr. Hagen's description in the Brit. Synop. seems to be compiled from Pictet, and not to have been drawn up from English insects.]

Page 155. *Heptagenia zebrata*. Your reduction of the Corsican species described by me is apparently erroneous. I give here the diagnoses of the forceps and penis. Your f. 24 is probably *fallax*, but (as you see) it is very different from the *zebrata* and *fluminum*. I cannot find the others in your work. In *zebrata* the antepenultimate joint of the forceps has a lamellose dilatation on the inside after the middle. The apical border of the last ventral segment is strikingly different.

[The examples sent me by M. de Selys-Longchamps were in bad condition. I could not make satisfactory drawings of details of *zebrata* or *fallax* from them. My figure was taken from the ♂ im., labelled *B. fluminum*, Hag. Of my descriptions that of the subimago was taken from specimens labelled respectively *zebrata* and *fallax*; that of the imago ♂ from a specimen labelled *fluminum* (the subject of my figure); and that of the imago ♀ from a specimen labelled *zebrata*. The only ♂ imago amongst them was that which stood for my drawing.]

Page 156, foot-note. *E. gemmata*. Scopoli's figure is thoroughly bad, and only shows that the insect is a large *Heptagenia*. Amongst the *Ephemeridæ* from Carinthia sent by Schmidt to me is a species which agrees so well with Scopoli's description that I have no doubt of its being the same insect as his. I have my types before me. It is a *Heptagenia* very nearly related to your *H. venosa*. It is wanting in Steph., Burm., Ramb. and Pict. [For further particulars see above. Note to p. 151, near the end of the paragraph, by Dr. Hagen.]